National Institute of Environmental Health Sciences

Analyzing human-landscape interactions: Tools that integrate

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Abstract:

Humans have transformed much of Earth's land surface, giving rise to loss of biodiversity, climate change, and a host of other environmental issues that are affecting human and biophysical systems in unexpected ways. To confront these problems, environmental managers must consider human and landscape systems in integrated ways. This means making use of data obtained from a broad range of methods (e.g., sensors, surveys), while taking into account new findings from the social and biophysical science literatures. New integrative methods (including data fusion, simulation modeling, and participatory approaches) have emerged in recent years to address these challenges, and to allow analysts to provide information that links qualitative and quantitative elements for policymakers. This paper brings attention to these emergent tools while providing an overview of the tools currently in use for analysis of human-landscape interactions. Analysts are now faced with a staggering array of approaches in the human-landscape literature - in an attempt to bring increased clarity to the field, we identify the relative strengths of each tool, and provide guidance to analysts on the areas to which each tool is best applied. We discuss four broad categories of tools: statistical methods (including survival analysis, multi-level modeling, and Bayesian approaches), GIS and spatial analysis methods, simulation approaches (including cellular automata, agent-based modeling, and participatory modeling), and mixed-method techniques (such as alternative futures modeling and integrated assessment). For each tool, we offer an example from the literature of its application in human-landscape research. Among these tools, participatory approaches are gaining prominence for analysts to make the broadest possible array of information available to researchers, environmental managers, and policymakers. Further development of new approaches of data fusion and integration across sites or disciplines pose an important challenge for future work in integrating human and landscape components.

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Resource Description

Communication: ☑

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience: ☑

audience to whom the resource is directed

Policymaker

Other Communication Audience: Environmental managers

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified